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山东莱阳鞘翅目化石*

张俊峰
(山东省博物馆,济南 250012)

近几年来,随着地层古生物工作的进一步开展,在东亚中生代晚期非海相沉积地层中发现了大量的昆虫化石,其中,鞘翅目的种类十分丰富。这些化石产地主要分布于我国甘肃酒泉,山东莱阳,蒙古人民共和国前杭爱(Ubur-Khangai)安达呼都克(Anda-Khuduk = Odai Sair),南戈壁(South-Gobi)曼来(Manlay),戈壁阿尔泰(Gobi-Altai)伊赫埃斯努尔(Ikhesnur),苏联外贝加尔(Transbaikalia)拜萨(Baissa)。从已知生物地层的资料分析,上述地区含昆虫化石地层的时代视为晚侏罗世似较合理。

迄今,山东莱阳莱阳组中的鞘翅目化石共描述了4属5种(秉志,1928;张俊峰,1988),他们是:*Coptoclava longipoda* Ping, *Proteroscarabaeus yeni* Grabau, *Mesostaphylinus laiyangensis* Zhang, *Laostaphylinus nigritellus*, *L. fuscus* Zhang。本文作者最近从莱阳地区采集到的甲虫化石较丰富,经初步鉴定,不少于30种,绝大多数是新属种。本文所描述的鞘翅目化石4属4种,其中2新属4新种,分别隶属于刺甲科(Coptoclavidae),露尾甲科(Nitidulidae),伪瓢虫科(Endomychidae)和金龟科(Scarabaeidae)。从昆虫生态学上分析,上述4科中除刺甲科的已知化石种类有水生种类外,余3个科的绝大多数现代种类或生存于花间、叶上,或以腐烂有机物为食。据此,这些科化石种类的发现,似可推测在晚侏罗世山东莱阳地区为一开阔的山间盆地,湖泊发育,杂草丛生,高大木本植物罕见,与现在的自然景观迥然不同。这些昆虫化石在恢复古地理、古气候、古生态和研究当时沉积、埋葬特征等诸方面都有重要的意义。

化石产地分别位于莱阳市南略偏西21公里处的南李格庄村,和25公里处的团旺村,以及莱阳市东北方向约13公里的马耳山。有关的交通位置和地层资料已有介绍(张俊峰,1987),不再赘述。

标本保存在山东省博物馆。

鞘翅目 Coleoptera

刺甲科 Coptoclavidae Ponomarenko, 1961

小刺甲属 *Coptoclavisca* Ponomarenko, 1987

模式种: *Coptoclavisca nigricollinus* Ponomarenko.

属征: 虫体中等大小。头和前胸背板大,不及鞘翅长的2/3;前胸背板不窄于鞘翅。

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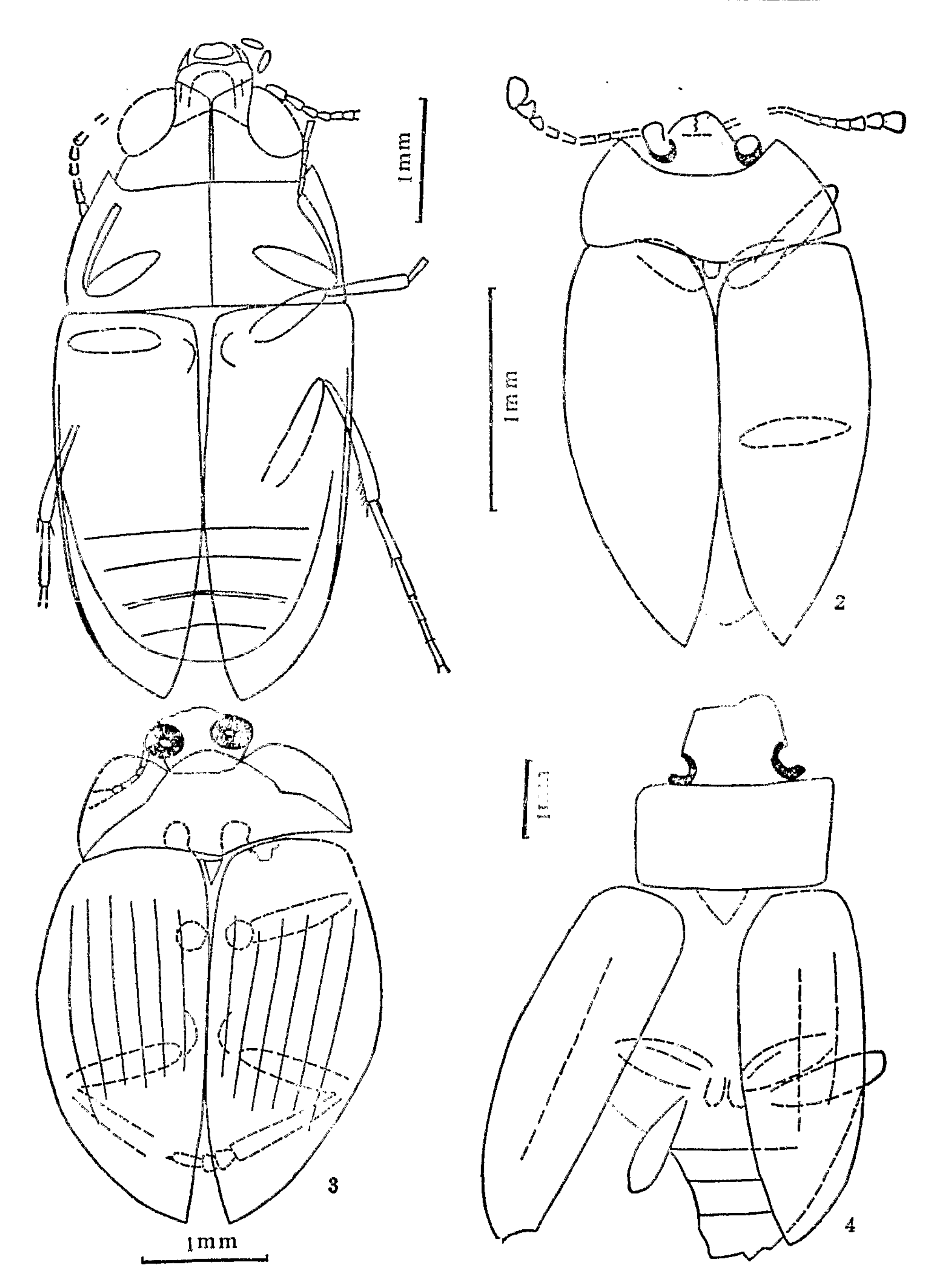


图 1 大眼小刺甲 *Coptoclavisca grandioculus* sp. nov. 登记号: L85344. 图 2 长角华露尾甲 *Sinosoronia longiantenna* gen. et sp. nov. 登记号: L85309. 图 3 裸古伪瓢虫 *Palaeoendomychus gymnus* gen. et sp. nov. 登记号: L85301. 图 4 无纹沟金龟 *Holcoribeus evittatus* sp. nov. 登记号: L85307.

前、中基节圆形。后胸具清晰的与基节平行的缝;后足基节具大型甚短的侧盖板。足胫节纤长。

分布和时代: 蒙古人民共和国东戈壁省和我国山东;晚侏罗世。

大眼小刺甲 *Coptoclavisca grandioculus* 新种(图版 I:1；图 1)

一块虫体背面保存标本；褐色；登记号：L85344（正模标本）。

头大，三角形，宽大于长；复眼巨大，颜色略浅，近长卵形，长约为头长的 1/2；上颚小，尖锐，略弯曲；颚须见端部两节，长卵形，显窄；触角保存中部 7 节，短于头，各节长柱状；头部中央具"Y"形缝。前胸背板横阔，宽为长的 2.1 倍，前缘略窄于后缘，两者皆平直，侧缘缓弧状弯曲，前侧角甚尖锐，前突；前胸背板中央具一条弱纵纹。小盾片不可分辨。鞘翅基部平直，最宽，与前胸背板后缘几乎等宽，鞘面上无纹饰和纵沟，长为宽(单个鞘翅)的 2.6 倍，内、外缘均较直，端部开裂，端角较显著，明显超过腹末。足纤长，各足股节细棒状，显粗且略短于胫节，后者略弯，端部稍宽，跗节 5 节，纤长，各节细柱状；前足跗节略短于胫节，基部 3 节各节逐渐变短，第 4 节最短，第 5 节长于第 3 节，为第 4 节长的 2 倍；后足胫节端部具 2 个距，内缘具毛丛，跗节显长于胫节，约为后者长的 1.3 倍，第 4 节略短于第 5 节，后者与第 3 节近等长。腹部可见 5 节腹节，腹末圆钝。

虫体长 5.3mm，宽 2.4mm。

比较：这个新种颇似 *C. nigricollinus*，但主要以甚大的复眼；显小的上颚；鞘翅上无纵沟；虫体较小等特征与后者可以区别。

产地层位：山东莱阳团旺；莱阳组第三段。

露尾甲科 Nitidulidae Leach, 1815

华露尾甲属 *Sinosoronia* 新属

模式种：*Sinosoronia longiantenna* 新属，新种

属征：虫体微小，卵形。头中等大小，三角形，深陷于前胸背板之内；复眼大；触角长，棒节松散。前胸背板短阔，前侧角尖锐，显突，后侧角显著。小盾片小，半圆形。鞘翅长，遮盖腹末；基边与前胸背板后缘等宽；肩角显著；端部开裂，端角尖锐。

比较：已知中生代露尾甲科仅 1 属：*Meligethiella* Medvedev，发现于苏联外贝加尔拜萨。这个新属与 *Meligethiella* 不同之处在于触角较长；前胸背板后缘阔，与鞘翅基边等宽，后侧角显著；鞘翅端部开裂，端角尖锐等。同时，这个化石新属以较长的触角，松散的棒节；甚小的小盾片；和开裂的鞘翅与这个科的第三纪和现代属都不同，也容易区别。

分布和时代：山东；晚侏罗世。

长角华露尾甲 *Sinosoronia longiantenna* 新属，新种(图版 I:2；图 2)

一块虫体背面保存标本；褐色；登记号：L85309(正模标本)。

头部长宽近相等；上颚宽大，颚齿分辨不清；复眼圆形，侧突显著，外侧保存不佳；触角长为头和前胸背板长度之和的 1.2 倍，基部数节保存不佳，唯柄节粗壮可见，余各鞭节柱状，长约为宽的 2 倍，棒节较长，约为触角总长的 1/3，向端部渐加宽。前胸背板宽为长的 2.1 倍；前缘弧形，中部平直，两侧向上弯曲；侧缘弧形；后缘略呈波状弯曲，与鞘翅基边连接紧密。小盾片长宽近相等。鞘翅光滑无饰；外缘与内缘均略弧状；肩角较圆；端部明显超过腹末；鞘翅长为宽(单个鞘翅)的 2.6 倍。中、后足股节保存痕迹，似棒状，余未保存。

虫体长 2.3mm，宽 1.3mm。

产地和层位：山东莱阳南李格庄；莱阳组第三段。

伪瓢虫科 Endomychidae Leach, 1815

古伪瓢虫属 *Palaeoendomychus* 新属

模式种：*Palaeoendomychus gymnus* 新属，新种

属征：虫体微小，坚实，卵圆形，无毛。头显缩于前胸背板内；复眼甚大，左右明显分离，略侧突；触角短，鞭节柱状。前胸背板横阔，中部隆起；前缘无膜；侧缘具甚宽扁平的边缘；后侧角显著。小盾片小，狭三角形，长显胜于宽。鞘翅宽阔，基边与前胸背板后缘等宽，连接紧密；肩角略圆；端部开裂，端角显著；鞘面上具沟纹。足正常，跗节短且窄，可见 3 节，基部第1、2节三角形，长宽近相等，第 3 节长显胜于宽，柱状。

比较：这个新属是伪瓢虫科在中生代的首次发现。它与东洋区的现代属 *Stenotarsus* Perty 较相似，但以甚大的复眼、狭长的三角形小盾片和鞘翅上具沟纹等特征与后者不同。

分布和时代：山东；晚侏罗世。

裸古伪瓢虫 *Palaeoendomychus gymnus* 新属，新种(图版 I:3，4；图 3)

两块虫体背面保存标本，为正反两个面；暗褐色；登记号：L85301，L85302（正模标本）。

头横阔，宽为长的 1.5 倍；复眼卵圆形，约占头宽的 2/3；触角基部和棒节保存不佳，中部可见 6 节，每节长约为宽的 2 倍。前胸背板宽为长的 2.4 倍，中部呈三角形隆起，侧缘十分宽阔、扁平，颜色略浅，为黄褐色；后缘波形弯曲。小盾片端角尖锐，长为宽的 1.5 倍。鞘翅最宽处位于中部，长为宽(单个鞘翅)的 2.2 倍，每个鞘翅上具 6 条浅的纵沟。足保存不佳，前、中足基节窝见痕迹，似圆形，左右分离；后足股节和胫节近等宽，等长，跗节长不及胫节长的 1/2，第 3 节长约与 1、2 两节长度之和相等。

虫体长 4.2mm，宽 2.8mm。

产地和层位：山东莱阳南李格庄；莱阳组第三段。

金龟科 Scarabaeidae Latreille, 1802

沟金龟属 *Holcoribeus* Nikritin, 1977

模式种：*Holcoribeus vittatus* Nikritin

属征：虫体不大，宽阔，坚实种类。头显长；上颚和上唇在唇基之下甚显露。前胸背板短阔，前、后侧角较圆。鞘翅短，未达腹末；鞘面上具模糊刻点和暗色纵沟。后翅具发育的向下弯曲部分，几乎为翅长的 1/2，无翅脉，仅见褶纹；Rs 与翅前缘平行。足爪无齿。

分布和时代：苏联外贝加尔和我国山东；晚侏罗世。

无纹沟金龟 *Holcoribeus evittatus* 新种(图版 I:5，6；图 4)

两块虫体背面保存标本，为正反两个面；褐色；登记号：L85307，L85308（正模标本）。

上唇未保存；头显窄于前胸背板，宽为长的 1.5 倍；复眼中等大小，近圆形，向外侧略突，左右明显分离，靠近前胸背板前缘。前胸背板横阔，长方形，宽为长的 1.8 倍；前、后缘及侧缘均平直，前、后侧角较圆，后缘与前缘等宽，显窄于鞘翅基边。小盾片保存不佳，似

中等大小，等边三角形。鞘翅无条纹，仅见 1 或 2 条模糊的纵沟；长为宽（单个鞘翅）的 3.5 倍；内缘或多或少平直，外缘略弯曲；端角较显著，未达腹末。足保存不佳，后足基节窝见痕迹，大型，横向；后足股节粗短，棒状，余未保存。腹部宽阔，腹末破损，保存基部 4 腹节。

虫体长 7.5mm，宽 3.5mm。

比较：沟金龟属原包括两个种：*Holcoribeus vittatus* Nikritin 和 *H. picturatus* Nikritin，系 Nikritin(1977)根据产自苏联外贝加尔拜萨扎扎组（Zaza Formation）的化石标本所建立。我国山东莱阳组的这个新种颇似 *H. vittatus*，但以鞘翅上无条纹、虫体较小等特征与后者可以区别。

产地和层位：山东莱阳马耳山；莱阳组。

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FOSSIL COLEOPTERA FROM LAIYANG, SHANDONG PROVINCE, CHINA

Zhang Jun-feng

(*Shandong Provincial Museum, Jinan* 250012)

Of late years, a great number of insect fossils from the Late Mesozoic non-marine sediments of East Asia have been discovered, of which the Coleoptera are abundant. The major localities yielded insect remains come from Jiuquan of Gansu Province, Laiyang of Shandong Province, China, and Anda-Khuduk (=Odai Sair) of Ubur-Khangai, Manlay of South-Gobi, the Ikhesnur of Gobi-Altai, Mongolia, as well as the Baissa of Transbaikalia, Russia. In the light of biostratigraphy, these insect-bearing deposits mentioned above may be of the Late Jurassic age from the point of view of the present writer.

This paper deals with four genera four species belonging separately to families Coptoclavidae, Nitidulidae, Endomuchidae and Scarabaeidae of Coleoptera, among which two genera and four species are new to science. The localities are in Nanligezhuang, Tuanwang and Mareshan Villages where the Laiyang Formation of Upper Jurassic is well developed.

Coptoclavidae Ponomarenko, 1961

Coptoclavisca Ponomareko, 1987

Coptoclavisca grandioculus sp. nov (Pl. I: 1; fig. 1)

No. L85433. Brown in color. Head large, triangular, noticeably wider than long, with "Y"-shaped suture. Eyes rather large, somewhat lighter in color, about half as long as head. Mandibles small but sharp, slightly curved. Last two segments of maxillary palp elongate oval and narrow. Antennae with seven segments distinguishable, shorter than head, each cylindrical. Pronotum transverse, 2.1 times as broad as long, with a longitudinal median suture, anterior margin narrower than posterior one, both straight, lateral margins arched, anterior angles rather sharp and extending forward. Scutellum not seen. Elytra with basal margin straight and nearly as wide as posterior margin of pronotum, without streak and striae, each elytron 2.6 times as long as wide, interior and exterior margins straight but dehiscent terminally, with terminal angles prominent, distinctly exceeding the apex of abdomen. Legs slender and long, femora clavate, distinctly stouter but a little shorter than tibiae, the latter slightly curved, somewhat widened terminally, tarsi five-segmented, slender and long, each cylindrical, with anterior tarsi barely shorter than tibia, basal three segments shortened gradually, the fourth shortest, the fifth longer than the third and twice as long as the fourth. Posterior tibiae each armed with two spurs, its interior margin clothed with hairs, tarsi 1.3 times as long as tibia, with the fourth a little shorter than the fifth, the latter nearly as long as the third. Abdomen five-segmented, apex of abdomen rounded.

Total length 5.3mm, width 2.4mm.

Comparison: *Coptoclavisca gradioculus* sp. nov. is very closely similar to *C. nigricollinus* Ponomarenko, but differs from the latter by the rather large eyes, the much smaller mandibles, the absence of streak and striae on elytra as well as body smaller in size.

Horizon and locality: The Laiyang Formation; Tuanwang of Laiyang, Shandong Province.

Nitidulidae Leach, 1815

Sinosoronia gen. nov.

Type species: *Sinosoronia longiantenna* gen. et sp. nov.

Diagnosis: Body minute, oval. Head of medium size, triangular, sunken deeply in pronotum. Eyes large. Antennae elongate, with loose club. Pronotum short, wide, anterior angles acute, clearly expanded forwards, posterior ones prominent, posterior margin as wide as base of elytra. Scutellum small, semicircular. Elytra long, dehiscent, covering apex of abdomen, shoulder prominent, terminal angles acute.

Comparison: So far, the Mesozoic nitidulid-beetles are known with only a single genus *Meligethiella* Medvedev from the Baissa of Transbaikalia, Russia. The present new genus may be distinguished from the latter by having elongate antennae, wide posterior margin of pronotum that is as wide as basal part of elytra, prominent posterior angles of pronotum, as well as the dehiscent elytra and acute terminal angles. Meanwhile, with the elongate and loose clubbed antennae, rather small scutellum and dehiscent elytra, *Sinosoronia* gen. nov. is separated easily from all the known Tertiary and recent genera of the family Nitidulidae.

Sinosoronia longiantenna gen. et sp. nov. (Pl. I: 2; fig. 2)

No. L85309. Brown in color. Head about as long as wide. Mandibles large but dentes indis-

tinguishable. Eyes circular, expanded laterally but exterior margin ill-preserved. Antennae 1.2 times as long as head and pronotum united, basal several segments ill-preserved except the thickened scape, each flagellum cylindrical, about twice as long as wide, club elongate, nearly one-third the length of antenna, slightly thickened apically. Pronotum 2.1 times as broad as long; anterior margin arched, its median part straight, curved forwards laterally, lateral margins arched, posterior margin sinuate, and closely connected to elytra. Scutellum about as long as wide. Elytra smooth, not striated, exterior and interior margins slightly arched, shoulder rounded, its terminal part distinctly exceeding apex of abdomen, each elytron 2.6 times as long as wide. Middle and posterior femora seemingly clubbed, both tibiae and tarsi absent.

Total length 2.3mm, width 1.3mm.

Horizon and locality: The Laiyang Formation; Nanligezhuang of Laiyang, Shandong Province.

Endomychidae Leach, 1815

Palaeoendomychus gen. nov.

Type species: *Palaeoendomychus gymnus* gen. et sp. nov.

Diagnosis: Body minute and compact, oval,hairless. Head deeply sunken in pronotum. Eyes rather large, far apart from each other, slightly prominent. Antennae short, flagellum cylindrical. Pronotum transverse, short, without membrance in front, but with lateral sides broadly flattened, posterior angles prominent. Scutellum small, narrowly triangular, distinctly longer than broad. Elytra wide, dehiscent, as wide at base as pronotum, and both closely connected with each other, humeral angles rounded, terminal angles prominent, surface with striae. Legs normal, with tarsi short and narrow, first and second tarsal segments triangular, each about as long as wide, third cylindrical, noticeably longer than wide.

Comparison: This new genus is the first discoveries of fungus beetles from the Mesozoic. It resembles *Stenotarsus* Perty, a modern genus distributed in Oriental Region, but differs from the latter in: eyes rather large; scutellum narrowly triangular and elytra with striae.

Palaeoendomychus gymnus gen. et sp. nov. (Pl. I: 3, 4; fig. 3)

No. L85301, L85302. Dark brown in color. Head transverse, 1.5 times as broad as long. Eyes oval, about two-thirds the width of head. Baseal segments and club of antennae ill-preserved, only six segments of flagellum visible, each about twice as long as wide. Pronotum excluding lateral borders triangular, 2.4 times as wide as long, lateral borders triangular, yellowish-brown in color, posterior margin sinuate. Scutellum 1.5 times as long as wide, with apex acute. Elytra widest near median part, each elytron 2.2 times as long as wide, with six shallow striae. Legs ill-preserved, anterior and middle coxal cavities seemingly circular, far apart from each other, posterior femora about as long and wide as tibiae, tarsi less than half the length of tibiae, third tarsal segment as long as the first and second united.

Total length 4.2mm, width 2.8mm.

Horizon and locality: Same as the preceding species.

Scarabaeidae Latreille, 1802

Holcoribeus *Nikritin*, 1977

Holcoribeus evittatus sp. nov. (Pl. I: 5, 6; fig. 4)

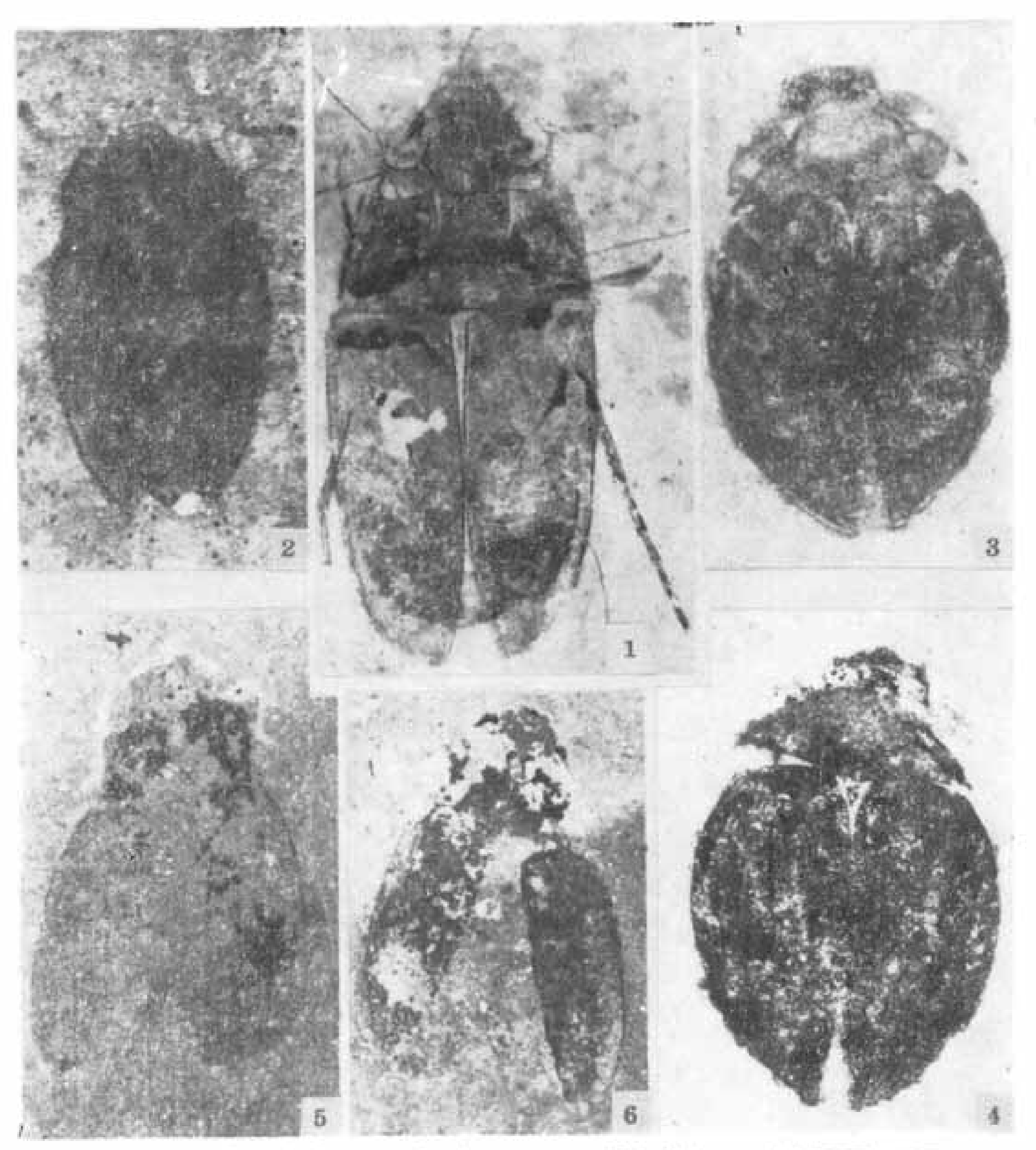
No. L85307, L85308. Brown in color. Labrum not preserved. Head distinctly narrower

than pronotum, 1.5 times as broad as long. Eyes of medium size, subcircular, slightly prominent laterally, far apart from each other and lying near anterior margin of pronotum. Pronotum transverse, oblong, 1.8 times as broad as long, all its margins straight, anterior and posterior margins equal in length, with angles rounded, and obviously narrower than elytra at base. Scutellum ill-preserved, seemingly moderately large, equilateral triangular in shape. Elytra striated only with one or two striae, each elytron 3.5 times as long as wide, interior margin more or less straight, exterior margin a little curved, terminal angles prominent, not reaching to apex of abdomen. Legs ill-preserved, posterior coxal cavities seemingly large, transverse, femora stout and short, clubbed, both tibiae and tarsi not seen. Abdomen wide, with apex damaged, only basal four segments visible.

Total length 7.5mm, width 3.5mm.

Comparison: The present new species is very similar to *Holcoribeus vittatus* Nikritin from the Zaza Formation of Baissa in Transbaikalia, Russia, but may be separated from the latter by streak on elytra absent and body small in size.

Horizon and locality: The Laiyang Formation; Mareshan of Laiyang, Shandong Province.



1.大眼小刺甲 *Coptoclavisca grandioculus* sp. nov. ×15.8; Holotype; 山东莱阳团旺；莱阳组（上侏罗统）；登记号： L85433. 2.长角华露尾甲 *Sinosoronia longiantenna* gen. et sp. nov. ×21; Holotype; 山东莱阳南李格庄；莱阳组（上侏罗统）；登记号：L85309. 3、4.裸古伪瓢虫 *Palaeoendomychus gymnus* gen. et sp. nov. × 15.5; Holotype; 山东莱阳南李格庄；莱阳组（上侏罗统）；登记号：L85301，L85302. 5、6.无纹沟金龟 *Holcoribeus evittatus* sp. nov. ×7.6; Holotype; 山东莱阳马耳山；莱阳组（上侏罗统）；登记号：L85307，L85308.